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Effect of the degree of cross-linking in nanosponges on the efficiency of piperine encapsulation

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Nanosponges (NSs) is a novel method of encapsulation, formed by the bonding of microscopic particles that form cavities of nanometric diameter (less than 1µm) capable of encapsulating a great variety of compounds of food interest. These cavities can incorporate lipophilic and hydrophilic compounds.The objective of this work was to evaluate the effect of the cross-linking degree in NSs. NSs were formed with beta-cyclodextrin (β-CD) and diphenyl carbonate (DPC) through the microwave-assisted method. ß-CD: DPC molar ratios of 1:2, 1:6 and 1:10 were tested and NSs were characterized through FTIR, the degree of substitution (DS) and specific surface (SBET) analysis. The appearance of characteristic peaks of ß-CD at 1155cm-1 belonging to the glycosidic bonds was observed. In addition, a peak was identified at 1750cm-1 which is an indicator of the carbonyl group (C=O), which also demonstrate the esterification between DPC and the hydroxyl groups of the ß-CD. The results showed NS 1:2 DS=0.345, NS 1:6 DS=0.629 and NS 1:10 DS=0.878 and NS 1:2 SS=0.77, NS 1:6 SS=1.22 and NS 1:10 SS=2.00m2/g. Therefore, the higher the molar ratio, the higher the DS and the higher the specific surfaces of NSs. In addition, the pore size range was from 23 to 63 Å classified as mesopores. It confirms the crosslinking process between the ß-CDs, obtaining NS synthesis. Therefore, increasing the number of substituents increases the probability of generating greater cross-linking and specific area to facilitate the inclusion of lipophilic compounds.

Biography

Juan Pablo Guineo Alvarado is a Food Engineer from the University of La Frontera, Temuco, Chile. Currently, he is a student of the Master's Program in Engineering Sciences with specialization in Biotechnology. His thesis is entitled “Effect of the degree of cross-linking in nanosponges on the encapsulation efficiency and release of piperine”, supported by Fondecyt project N°1160558. “Nanoencapsulation of polyunsaturated fatty acids and pungency alkaloids using nanosponges as carrier model to deliver lipophilic compounds of high biological value”. This research was supported by funding from Conicyt through Fondecyt project.

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